

### **DRAWINGS**

Applicant does not believe any more drawings are required to support the Claims and Specification as previously amended and submitted. The Examiner has objected to the drawings as submitted for not showing every feature of the invention as specified in the claims. Specifically, the "exterior channel is formed by opposing grooves with the stator and the rotor." These elements, however, are shown at FIG. 1 and FIG. 4, and labeled as "exterior annular channel 31."

### **REMARKS/ARGUMENTS**

Examiner has cited U.S. Patent #5,122,095 issued to Orlowski (hereinafter "Orlowski") as anticipating Applicant's invention. Firstly, regarding claims, 35, 44, 45 and 47, it is applicant's position that the Orlowski reference cannot anticipate the present art fore the Orlowski reference requires a stator and a rotor working in combination to form a shaft seal assembly. Orlowski does not teach or suggest that the Orlowski reference may be modified for "stator" only operation.

Secondly, Applicant's testing of the particular bearing isolators covered by this patent application, under live operating conditions and conducted under confidential conditions, indicated a significant amount of improvement over the prior art. *See* Hoehle Declaration. The examiner is generally correct in citing the general rule regarding optimum ranges or variables in a known process is presumed to be obvious if it is discovered through routine experimentation. In *re* Aller, 220 F.2d 454. This presumption may be overcome, however, by showing that such optimum variables are not in fact obvious, particularly when the parameter to be optimized was not recognized by the prior art to be a result-effective variable. In *re* Antoine, 559 F.2d 618, 620.

Applicant does not, however, agree with the examiner that one of ordinary skill in the art would have learned the present art through routine experimentation. Filed herewith is a 37 CFR § 1.132 Declaration of Neil Hoelhe, an expert in the field of pump seals, bearings and bearing isolators. The following facts set forth in Hoelhe's declaration establish the following:

1. Testing conducted by Declarant of designs similar to those disclosed in Orlowski and Fedorovich indicated lube oil turbulence induced by shaft rotation created a lube oil bubble, which inhibited effective drainage

through the slots of the shallow conical or annular grooves as taught by either Orlowski or Federovich. *See* Declaration of Hoelhe, ¶14.

2. None of the references individually or in combination, teach, describe or suggest creation of a lube oil bubble or the effects of lubricant turbulence on an annular stator groove or cavity adjacent to and/or exposed to the shaft to strip operable for the collection of lubricant adhering thereto. *See* Hoelhe Declaration, ¶18-21.
3. Placement of a deep annular groove sized to be as wide and deep as allowable by the materials chosen for the stator, and positioned to face the shaft, reduced lubricant turbulence thereby increasing seal efficacy. *See* Declaration of Hoelhe, ¶17.
4. Applicant's testing of the particular bearing isolators covered by this patent application, under live operating conditions and conducted under confidential conditions, indicated a significant amount of improvement over the prior art. *See* Hoelhe Declaration, ¶17.
5. The size and position of the deep annular groove were not considered result effective variables prior to the testing carried out by Applicant. *See* Declaration of Hoelhe, ¶19-20.

Because the size and position of applicant's deep annular groove were not considered result effective variables prior to testing, a person of ordinary skill in the art, in view of the Orlowski reference or the combination of Orlowski and Federovich references, would not have determined the size and position of the deep annular groove through routine testing to reduce the effect of turbulence on the lube oil to reduce seal leakage and improve seal efficacy. Therefore, the references relied on by the examiner do not, in fact, teach one of ordinary skill in the art what the examiner opines they teach.

Finally, responding to the rejection of the claims §103 for obviousness, applicant submits that the combined teaching of Federovich with Orlowski does not obviate the present art. Federovich is silent on the creation of a lube oil, lube oil turbulence and or lubricant turbulence inhibiting effective drainage of lubricant stripped from the shaft. Neither of the patents cited in the outstanding Office action, nor any other evidence of record, establish a prima facie case of obviousness.


### CONCLUSION

The prior art cited by the examiner does not anticipate applicant's invention. The examiner has not met the burden required for a prima facie case obvious case. In light of the above amendments and remarks, applicant submits that the claims are in condition for allowance, and requests that the outstanding rejections be withdrawn. If a telephone conference would expedite allowance of the claims, the examiner may wish to telephone Applicant's Attorney at 563-441-0207.

Respectfully submitted,  
Isotech of Illinois, Inc.

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By

  
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## CLAIMS LISTING (MARKED-UP)

1.-34. (Cancelled)

35. (Amended) A seal fixed between a housing and a rotating shaft

comprising:

- a. a stator fixed and sealingly mounted to the housing and concentrically about the shaft, said stator having opposite end faces, an exterior peripheral surface and an interior peripheral surface;
- b. a first annular groove formed in said stator and extending axially between said end faces and positioned intermediate said exterior and interior peripheral surfaces, wherein said first annular groove communicates directly with said shaft and is sized to be as wide and deep as allowable by the materials chosen for the stator and is operable to collect fluid material separated from said shaft; and,
- c. at least one axial slot formed in said interior peripheral surface of said stator, wherein said at least one axial slot communicates with said first annular groove in said stator for draining fluid material collected in said first annular groove into said housing.

36. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 35 further comprising:

- a. a rotor sealingly mounted to said shaft for rotation therewith and having opposite end faces, an exterior peripheral surface and an interior peripheral surface;

- b. a second annular groove formed in said stator exterior end face and extending axially from said stator exterior end face, said second annular groove located intermediate said stator exterior and interior peripheral surfaces;
- c. a rotor annular flange formed in said rotor, said rotor annular flange extending axially from an end face of said rotor and positioned intermediate to said rotor exterior and interior peripheral surfaces, wherein said rotor annular flange is received within said second annular groove in said stator;
- d. an exterior annular channel formed by engagement of said rotor and said stator for collecting contaminants entering said seal; and,
- e. a port extending from said exterior annular channel to the exterior of said housing to expel contaminants from said exterior annular channel.

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Cancelled)

41. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 36 wherein said stator and said rotor are unitized by a unitizing ring, wherein said unitizing ring seats in a stator unitizing ring groove when said shaft is not rotating thereby sealing the interior of said seal from the exterior of said seal, wherein said unitizing

ring rotates with said rotor and wherein said unitizing ring expands during rotation so that said unitizing ring seats in a rotor unitizing ring groove.

42. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 41 wherein said unitizing ring operates with no clearance between said rotor unitizing ring groove or said stator unitizing ring groove when said shaft rotates.
43. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 36 wherein the bottom of said axial slot is formed at an angle with respect to said shaft.
44. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 35 wherein the clearance between said stator and said shaft is 0.005 inches for each inch of shaft diameter.
45. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 35 further comprising a plurality of axial slots, wherein the circumferential periphery of said first annular groove in said stator bisects said plurality of axial slots and wherein adjacent axial slots are spaced so that a line connecting the center of one axial slot to the center of the adjacent axial slot does not intersect the interface between said stator and said shaft.
46. (Cancelled)



47. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 35 wherein said first annular groove is comprised of a plurality of annular grooves formed in said stator and extending axially between said stator end faces and positioned intermediate said exterior and interior peripheral surfaces, wherein said plurality of annular grooves communicate directly with said shaft and are operable to collect fluid material separated from said shaft.
48. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 47 further comprising:
- a. a rotor is sealingly mounted to said shaft for rotation therewith and having opposite end faces, an exterior peripheral surface and an interior peripheral surface;
  - b. a second annular groove formed in said stator exterior end face and extending axially from said stator exterior end face, said second annular groove located intermediate said stator exterior and interior peripheral surfaces;
  - c. a rotor annular flange formed in said rotor, said rotor annular flange extending axially from an end face of said rotor and positioned intermediate to said rotor exterior and interior peripheral surfaces, wherein said rotor annular flange is received within said second annular groove in said stator;

- d. an exterior annular channel formed by engagement of said rotor and said stator for collecting contaminants entering said seal; and,
  - e. a port extending from said exterior annular channel to the exterior of said housing to expel contaminants from said exterior annular channel.
49. (Cancelled)
50. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 48 wherein said exterior annular channel is positioned within said rotor extending axially from one rotor end face intermediate the exterior and interior peripheral surfaces of said rotor.
51. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 48 wherein said exterior annular channel is positioned within said stator extending axially from one stator end face intermediate the exterior and interior peripheral surfaces of said stator.
52. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 48 wherein said exterior annular channel is formed by opposing grooves within said stator and said rotor, wherein said opposing grooves extend axially from one stator end face and one rotor end face intermediate the exterior and interior peripheral surfaces of said stator and said rotor.
53. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 48 wherein said stator and said rotor are unitized by a unitizing ring, wherein said unitizing ring seats in a stator

unitizing ring groove when said shaft is not rotating thereby sealing the interior of said seal from the exterior of said seal, wherein said unitizing ring rotates with said rotor and wherein said unitizing ring expands during rotation so that said unitizing ring seats in a rotor unitizing ring groove.

54. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 53 wherein said unitizing ring operates with no clearance between said rotor unitizing ring groove or said stator unitizing ring groove when said shaft rotates.
55. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 48 wherein the bottom of said axial slot is formed at an angle with respect to said shaft.
56. (Amended) The seal fixed between a housing and a rotating shaft as set forth in claim 47 wherein the clearance between said stator and said shaft is 0.005 inches for each inch of shaft diameter.
57. (Previously Presented) The seal fixed between a housing and a rotating shaft as set forth in claim 47 further comprising a plurality of axial slots, wherein the circumferential periphery of said first annular groove in said stator bisects said plurality of axial slots and wherein adjacent axial slots are spaced so that a line connecting the center of one axial slot to the center of the adjacent axial slot does not intersect the interface between said stator and said shaft.